

Technical Information



As applications become more complex, specifying wire and cable products to meet commercial, industrial and specialty requirements has become more time consuming and complex.

Today's designers, installers and contractors must be aware not only of general power transmission line types but also of the myriad of materials available to meet specific environmental and electrical performance criteria.

This technical section is presented to aid in the selection of instrumentation, power and control products to best suit specific designs and applications.

For technical issues and questions, please contact your local General Cable distributor or our customer service department.

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Glossary

Abrasion Resistance: Ability of a wire, cable or material to resist surface wear.

Accelerated Aging: A test in which voltage, temperature, etc. are increased above normal operating values to obtain observable deterioration in a relatively short period of time. The plotted results give expected service life under normal conditions.

ACM: Aluminum conductor material.

Accelerator: A chemical additive that hastens a chemical reaction under specific conditions.

Admittance: The measure of the ease with which an alternating current flows in a circuit. The reciprocal of impedance.

AEIC: Association of Edison Illuminating Companies

Aerial Cable: A cable suspended in the air on poles or another overhead structure.

Aging: The change in properties of a material with time under specific conditions.

AIA: Aluminum Interlocked Armor.

Alloy: A metal formed by combining two or more different metals to obtain desirable properties.

Alternating Current: Electric current that continually reverses its direction. It is expressed in cycles per second (hertz or Hz).

Ambient Temperature: The temperature of the medium surrounding an object. Generally a lower temperature than the temperature at which the cable is operating.

American Wire Gauge (AWG): A standard North American system for designating wire diameter.

Ampacity: See Current Carrying Capacity.

Ampere: The unit of current. One ampere is the current flowing through one ohm of resistance at one volt potential.

Analog: A data format using continuous physical variables such as voltage amplitude or frequency variations.

Anneal (Soften): Relief of mechanical stress through heat and gradual cooling. Annealing copper renders it less brittle.

Armor: A protective metal covering commonly in the form of flexible interlocking aluminum or steel tape, steel wires, or aluminum sheath.

ASTM: American Society for Testing and Materials.

Attenuation: The general term used to denote the decrease of power from one point to another. In fiber optics, the optical power loss per unit length is expressed logarithmically in decibels per kilometer (dB/km) at a specific wavelength.

Audio Frequency: The range of frequencies audible to the human ear. Usually 20-20,000 Hz.

AWM: Designation for appliance wiring material.

Balanced Circuit: One utilizing cables having two or more identical conductors with the same electromagnetic characteristics in relation to each other and to ground.

Band Marking: A continuous circumferential band applied to a conductor at regular intervals for identification.

Bandwidth: (1) The difference between the upper and lower limits of a given band of frequencies. Expressed in Hertz. (2) A measure of the maximum frequency range over which light intensity exiting a waveguide one kilometer in length can be varied before the attenuation varies 3dB from the mean. The greater the bandwidth, the greater the information carrying capacity. Bandwidth is expressed in Megahertz (MHZ)–Kilometer (km).

Bending Radius: Radius of curvature that a cable can be safely bent without any adverse effects.

Binder: A spirally served tape used for holding assembled cable components in place awaiting subsequent manufacturing operations.

Bonding Conductor: An insulated or uninsulated conductor forming part of the cable assembly which is used for the purpose of connecting non-current carrying parts of electrical equipment to a system grounding conductor.

Braid: A fibrous or metallic group of filaments interwoven in cylindrical shape to form a covering over one or more wires.

Braid Angle: The smaller of the two angles formed by the shielding strand and the axis of the cable being shielded.

Braid Carrier: A spool or bobbin on a braider that holds one group of strands or filaments consisting of a specific number of ends. The carrier revolves during braiding operations.

Braid Ends: The number of strands used to make up one carrier. The strands are wound side-by-side on the carrier bobbin and lie parallel in the finished braid.

Breakdown Voltage: The voltage at which the insulation between two conductors breaks down.

B & S Gauge: The same as American Wire Gauge (AWG).

Buffer: A protective coating over an optical fiber.

Building Wire: A general term used for light and power wiring products, 1000 volts or less.

Bunch Stranding: A group of wires of the same diameter twisted together without a predetermined pattern. Used in flexible cords and cables.

Buried Cable: A cable installed directly in the earth without use of underground conduit. Also called "direct burial cable."

Butyl Rubber: A synthetic rubber with good insulating properties (i.e. low voltage cords).



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Glossary

- Cable:** An insulated conductor, or group of individually insulated conductors in one assembly.
- Cabling:** The twisting together of two or more insulated conductors to form a cable.
- Capacitance:** The ratio of the electrostatic charge on a conductor to the potential difference between the conductors required to maintain that charge. Units expressed in Farads.
- Capacitive Coupling:** Electrical interaction between two conductors caused by the capacitance between them.
- Capacitive Reactance (Xc):** The opposition to alternating current due to the capacitance of the cable or circuit. Measured in ohms.
- CE Code, CEC:** Canadian Electrical Code
- Certified Test Report (CTR):** A report providing actual test data on a cable. Tests are normally conducted by the Quality Control Department to confirm that the product being shipped conforms to specifications.
- Characteristic Impedance:** The impedance that, when connected to the output terminals of a transmission line of any length, makes the line appear infinitely long. The ratio of voltage to current at every point along a transmission line on which there are no standing waves.
- Circular Mil (cmil):** The area of a circle one mil (.001") in diameter (7.854×10^{-7} sq in). Used in expressing wire cross-sectional area.
- Circuit Sizes:** A popular term for building wire sizes 14 through 10 AWG.
- Cladding:** (1) A method of applying a layer of metal over another metal whereby the junction of the two metals is continuously welded. (2) A low refractive index material that surrounds the core of an optical fiber causing the transmitted light to travel down the core and protects against surface contaminant scattering.
- Coaxial Cable:** A cable consisting of two cylindrical conductors with a common axis, separated by a dielectric.
- Cold Flow:** Permanent deformation of the insulation or jacket due to mechanical force or pressure, (not due to heat softening).
- Color Code:** A system for circuit identification through use of solid colors and contrasting tracers.
- Composite Cable:** One containing more than one type or gauge size of conductors (e.g. power and control conductors in one assembly).
- Compound:** An insulating or jacketing material made by mixing two or more polymeric ingredients.
- Concentric Stranded Conductors:** Manufactured to ASTM, ICEA, and CSA standards. The most common fixed installation type conductors are: 1) Round—no diameter reduction; 2) Compressed—approximately 3% diameter reduction; 3) Compact—approximately 10% diameter reduction.
- Concentric Stranding:** A central wire surrounded by one or more layers of helically wound strands in a fixed round geometric arrangement.
- Concentricity:** The measurement of the location of the center of the conductor with respect to the geometric center of the surrounding insulation.
- Conductivity:** The capacity of a material to carry electrical current—usually expressed as a percentage of copper conductivity (copper being 100%).
- Conductor:** An uninsulated wire suitable for carrying electrical current.
- Conductor Shield:** An extrusion of black semi-conducting thermoset material over the conductor to provide a smooth interface with the insulation for even distribution of electrical stress.
- Conduit (Electrical Raceway):** A tube or pipe in which insulated wires and cables are run.
- Connector:** A device used to physically and electrically connect two or more conductors. Also used to physically connect cable to equipment.
- Continuity Check:** A test to determine whether electrical current flows continuously throughout the length of a single wire or individual wires in a cable.
- Continuous Vulcanization:** Simultaneous extrusion and vulcanization of rubber-like (thermoset) coating materials. Often referred to as CV.
- Control Cable:** A multi-conductor cable made for operation in control of signal circuits.
- Copolymer:** A compound resulting from the polymerization of two different monomers.
- Copperweld:** The trade name of Flexo Wire Division (Copperweld Steel Corp.) for its copper-clad steel conductors.
- Cord:** A small, flexible, insulated wire or cable.
- Core:** In cables, a component or assembly of components over which additional components (shield, sheath, etc.) are applied.
- Corona:** A discharge due to ionization of air around a conductor due to a potential gradient exceeding a certain critical value.
- Coverage:** The percent of completeness with which a metal serving covers the underlying surface.
- CPE:** Chlorinated polyethylene can be used as either a thermoplastic or thermoset. It is a tough chemical and oil-resistant material and makes an excellent jacket for industrial control cable. As a thermoset, it can be used as an oil-resistant cord jacket. Typical temperature ratings range from -35°C to 90°C. Other outstanding properties include low water absorption and super crush resistance, which are important attributes in industrial control applications.
- Creep:** The dimensional change with time of a material under a mechanical load.

Glossary

Cross-linked: Inter-molecular bonds between long chain thermoplastic polymers by chemical or electron bombardment means. The properties of the resulting thermosetting material are usually improved (e.g. XLPE).

Crosstalk: Signal interference between nearby conductors caused by pickup of stray energy.

CSA: Canadian Standards Association

Current Carrying Capacity (Ampacity): The maximum current an insulated conductor can safely carry without exceeding its insulation and jacket temperature limitations.

Cut-Through Resistance: The ability of a material to withstand cutting from a sharp edge or small radius under pressure.

Decibel (dB): A unit to express differences of power level. Used to express power gain in amplifiers or power loss in passive circuits or cables. The units in which the ratio of two power levels, P_1 and P_2 , are expressed. The ratio in dB is given as $-10 \log_{10} (P_1/P_2)$.

$$P_2 \rightarrow \square \rightarrow P_1$$

Delay Line: A cable made to provide very low velocity of propagation with long electrical delay for transmitted signals.

Derating Factor: A factor used to reduce the current carrying capacity of a wire when used in environments other than that for which the value was established.

Dielectric: Any insulating material between two conductors that permits electrostatic attraction and repulsion to take place across it.

Dielectric Constant (K): The ratio of the capacitance of a condenser with dielectric between the electrodes to the capacitance when air is between the electrodes. Also called Permittivity and Specific Inductive Capacity (SIC).

Dielectric Strength: The voltage which an insulation can withstand before breakdown occurs. Usually expressed as a voltage gradient (such as volts per mil).

Dielectric Test: A test in which a voltage higher than the rated voltage is applied for a specified time to determine the adequacy of the insulation under normal conditions. Sometimes called a "Hi-Pot" test (high potential).

Digital: A data format that uses discrete or separate physical levels to contain information.

Direct Burial Cable: A cable installed directly in the earth.

Direct Current: An electric current that flows in only one direction.

Direction of Lay: The lateral direction in which the strands of a conductor run over the top of the cable conductor as they recede from an observer looking along the axis of the conductor or cable. Also applies to twisted cable.

Dissipation Factor: The tangent of the loss angle of the insulating material. (Also referred to as loss tangent, $\tan \delta$, and approximate power factor.)

Drain Wire: The uninsulated wire in contact with an electrostatic shield throughout its length, in an instrumentation or control cable, used to discharge unwanted signals. Also provides a means of terminating laminated shields. Sometimes used to describe the metallic shielding wires of a power cable insulation shield.

Drawing: In wire manufacturing, pulling the metal through a die or series of dies to reduce diameter to a specified size.

Earth: British terminology for zero-reference "ground."

Eccentricity: Like concentricity, a measure of the center of a conductor's location with respect to the circular cross section of the insulation. Expressed as a percentage of displacement of one circle within the other.

EEMAC: Electrical and Electronic Manufacturers Association of Canada (U.S. counterpart is NEMA).

Elastomer: A rubber-like substance. Any material that will return to its original dimensions after being stretched or distorted.

Electrostatic Shield: A copper or laminated aluminum/mylar tape wrap around a signal or instrumentation circuit (pair, triad, etc.) to protect from the electric field radiated by a voltage source. The grounded shield intercepts static interference and carries it off to ground.

Elongation: The fractional increase in length of material stressed in tension.

EMI: Abbreviation for electromagnetic interference.

EMRC: Energy Mines and Resources Canada

EPDM: Ethylene-propylene-diene monomer rubber. A material with good electrical insulating properties.

EPR: Ethylene-propylene copolymer rubber. A material with good electrical insulating properties.

Equal Load Sharing: An even distribution of current between the parallel cables in a power circuit.

Equilay: See Unilay: More than one layer of helically laid wires with the length of the lay the same for each layer.

Farad: A unit of electrical capacity.

Fatigue Resistance: Resistance to metal crystallization which leads to conductors or wires breaking from flexing.

Ferrous: Composed of and/or containing iron. A ferrous metal exhibits magnetic characteristics (e.g. steel armor).

FEP: Fluorinated ethylene propylene insulated wire (see Teflon).

Fiber: A single, separate optical transmission element characterized by core and cladding.

Fiber Optics: Light transmission through optical fibers for communication and signaling.



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Glossary

Filled Cable: Cable construction in which the cable core is filled with a material that will prevent moisture or gasses from entering or passing through the cable.

Filler: 1) A material used in multi-conductor cables to occupy large interstices formed by the assembled conductors; 2) An inert substance added to a compound to improve properties.

Flat Cable: A cable with two essentially flat surfaces (e.g. NMD90).

Flat Conductor: A wire having a rectangular cross section as opposed to round or square conductors.

Flame Resistance: The ability of a material not to propagate flame once the heat source is removed (see FT1).

Flammability: The measure of the material's ability to support combustion.

Flex Life: The measurement of the ability of a conductor or cable to withstand repeated bending before breaking.

Flexibility: The ease with which a cable may be bent without sustaining damage.

FT1: One of several CSA flame test designations for wires and cables which pass the C22.2 No. 0.3 test requirements. (Other designations include FT2, FT4, etc.).

Fusion Splice: A splice accomplished by the application of localized heat sufficient to fuse or melt the ends of two lengths of optical fiber, forming a continuous single fiber.

Gauge: A term used to denote the physical size of a wire.

GND: Abbreviation for ground.

Graded-Index: A type of optical fiber in which the refractive index of the core is in the form of a parabolic curve, decreasing toward the cladding. This type of fiber provides high bandwidth capabilities.

Ground (GND): 1) A conducting connection between an electrical circuit and the earth, or other large conducting body, to serve as an earth thus making a complete electrical circuit; 2) Term used for non-current carrying conductor in a cable (see Bonding Conductor).

Halogen: A term used to identify any of the four elements chlorine, fluorine, bromine and iodine, grouped together because their chemical properties are similar.

Hard Drawn Copper Wire: Copper wire that has not been annealed after drawing.

Heat Shock: A test to determine stability of a material by sudden exposure to a high temperature for a short period of time.

Henry: The unit of inductance.

Hertz (Hz): A term replacing cycles-per-second as an indication of frequency.

Hi-Pot (High Potential): A test designated to determine the highest voltage that can be applied to a conductor without breaking down the insulation (see Dielectric Test).

High Voltage (HV): Generally, a wire or cable with an operating voltage of over 600 volts.

Hook-Up Wire: A wire used for low current, low voltage (under 1000 volts) applications within enclosed electronic equipment.

Hygroscopic: A material capable of absorbing moisture from the air.

Hypalon®: Dupont's trade name for their chlorosulfonated polyethylene, an ozone resistant synthetic rubber.

ICEA (formerly IPCEA): Insulated Cable Engineers Association.

IEEE: Institute of Electrical and Electronics Engineers.

Impact Strength: A test for determining the mechanical punishment a cable can withstand without physical or electrical breakdown by impacting with a given weight, dropped a given distance, in a controlled environment.

Impedance: The total opposition that a circuit offers to the flow of alternating current or any other varying current at a particular frequency. It is a combination of resistance R and reactance X, measured in ohms.

Inductance: The property of a circuit or circuit element that opposes a change in current flow, thus causing current changes to lag behind voltage changes. It is measured in henrys.

Insulation: A material having good dielectric properties permitting close assembly of conductors in cable and equipment.

Insulation Level: A designation used to identify the insulation thickness required to protect a high voltage cable under ground fault conditions. Expressed as a percentage (e.g. 100% level, 133% level).

Insulation Shield (HV Cable): A two part shield consisting of a non-metallic component and a metallic component. The first component is an extrusion of black semi-conducting thermoset material over the insulation which provides uniform radial stress distribution across the insulation. The second component is a metallic shield which is typically copper tape or wire that functions as a bonding (grounding) conductor and/or a neutral conductor. The metallic shield also serves to conduct ground fault current in the event of insulation failure. See also drain wire.

Insulation Stress: High voltage stress which causes molecular separation in the insulation at sharp projections in the conductor. Controlled by conductor and insulation shielding, called a stress relief shield. Measured in volts per mil.

Interaxial Spacing: Center to center conductor spacing.

Interstices: Voids or valleys between individual strands in a conductor or between insulated conductors in a multi-conductor cable, (interstitial spaces).



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Irradiation: In insulations, the exposure of the material to high energy emissions for the purpose of favorably altering the molecular structure by crosslinking.

Jacket: An outer covering, usually non-metallic, mainly used for protection against the environment.

kcmil: One thousand circular mils (MCM).

KILO: A prefix denoting 1000 (10³).

kV: Kilovolt (1000 volts).

Laminated Tape: A tape consisting of two or more layers of different materials bonded together (e.g. aluminum/Mylar®).

Lay: The length measured along the axis of a wire or cable required for a single strand (in stranded wire) or conductor (in cable) to make one complete turn about the axis of the conductor or cable.

Lay Direction: The twist in the cable as indicated by the top strands while looking along the axis of the cable away from the observer. Described as "right hand" or "left hand."

Leakage Current: The undesirable flow of current through or over the surface of an insulation.

Line Drop (Voltage Drop): A voltage loss occurring between any two points in a power circuit. Such loss, or drop, is due to the resistance, reactance, or leakage of the circuit, type of cable and configuration.

Line Voltage: The value of the potential existing on a supply or power line. Rated voltage of cables.

LOCA: Abbreviation for loss of coolant accident, a system malfunction associated with nuclear generating stations.

Longitudinal Shield: A tape shield, flat or corrugated, applied longitudinally with the axis of the core being shielded.

Loss Factor: The product of the dissipation and dielectric constant of an insulating material.

μA. Microampere: One-millionth of an ampere (10⁻⁶).

mA. Milliampere: One-thousandth of an ampere (10⁻³).

Magnetic Noise: Caused by current frequency. An AC powerline creates a magnetic field around that cable, this magnetic field causes the magnetic noise in neighboring control or instrumentation circuits.

MCM: One thousand circular mils (kcmil).

Meg or Mega: A prefix denoting 1,000,000 (10⁶).

Megarad: A unit for measuring radiation dosage.

Messenger: The linear supporting member, usually a high strength steel wire, used as the supporting element of a suspended aerial cable. The messenger may be an integral part of the cable, or exterior to it.

Mho: The unit of conductivity. The reciprocal of an ohm.

Micro: A prefix denoting one-millionth (10⁻⁶).

Micron: (m) Millionth of a meter = 10⁻⁶ meter.

Mil: A unit of length equal to one-thousandth of an inch (.001"). Common unit for insulation thickness.

Milli: A prefix denoting one-thousandth (10⁻³).

Modulus of Elasticity: The ratio of stress to strain in an elastic material.

Moisture Absorption: The amount of moisture, in percentage, that a material will absorb under specified conditions.

Moisture Resistance: The ability of a material to resist absorbing moisture from the air or when immersed in water.

Multi-Conductor Cable: A cable consisting of two or more conductors, either cabled or laid in a flat parallel construction, with or without a common overall covering.

Mutual Capacitance: Capacitance between two conductors when all other conductors including ground are connected together.

Mylar®: DuPont trade name for a polyester material.

Nano: A numerical prefix denoting one-billionth (10⁻⁹).

National Electrical Code (NEC): A U.S. consensus standard published by the National Fire Protection Association (NFPA) and incorporated in OSHA regulations. (Canadian Counterpart is the CE Code).

NEMA: National Electrical Manufacturers Association. (Canadian counterpart is EEMAC).

Neoprene: A synthetic rubber with good resistance to oil, chemicals, and flame. Also called polychloroprene.

Nomex®: Dupont trademark for a temperature resistant, flame-retardant nylon.

Non Hygroscopic: A material incapable of taking up or absorbing moisture from the air.

Nylon®: An abrasion-resistant thermoplastic with good chemical resistance. A DuPont registered trademark.

OHM: The electrical unit of resistance.

OSHA: Abbreviation for the U.S. Occupational Safety and Health Act.

Overlap: The amount the trailing edge laps over the leading edge of a spiral tape wrap.

Oxygen Index: Percentage of oxygen necessary to support combustion in a gas mixture. Flame retardant materials have a higher oxygen index.

Pair: Two insulated wires of a single circuit twisted together or laid parallel.

Parallel Cable: Two or more cables used to share the current in heavily loaded power circuits which permits the use of smaller conductors.

Percentage Conductivity: Conductivity of a material expressed as a percentage of that of copper. Also used to indicate ratio of conductance between the phase conductor and the neutral in power cables.



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Pick: Distance between two adjacent crossover points of braid filaments. The measurement in picks per inch indicates the degree of coverage.

PICO: A prefix denoting one-millionth of one-millionth (10⁻¹²).

Pitch: In flat cable, the nominal distance between the index edges of two adjacent conductors.

Pitch Diameter: Diameter of a circle passing through the center of the conductors in any layer of a multi-conductor cable.

Plastic Deformation: Change in dimensions under load that is not recovered when the load is removed.

Plasticizer: A chemical agent added to plastics to make them softer and more pliable.

Plenum Cable: Cable approved for installation in plenums, (e.g. suspended ceiling) without the need for conduit.

Polyester: Polyethylene terephthalate which is used extensively in the production of a high strength moisture resistant film used as a cable core wrap (see Mylar).

Polyethylene (PE): A thermoplastic material having excellent electrical and physical properties.

Polymer: A material of high molecular weight formed by the chemical union of monomers.

Polyolefin: A family of thermoplastics based upon the unsaturated hydrocarbons known as olefins. When combined with butylene or styrene polymers they form compounds such as polyethylene and polypropylene.

Polypropylene (PPE): A thermoplastic similar to polyethylene but stiffer and having a higher softening point (temperature).

Polyurethane/PUR: This thermoplastic material is used primarily as a cable jacket material. It has excellent oxidation, oil, and ozone resistance. Some formulations also have good flame resistance. It is a hard material with excellent abrasion resistance. It has outstanding "memory" properties, making it an ideal jacket material for retractile cords.

Polyvinyl Chloride (PVC): A general purpose thermoplastic used for low voltage wire and cable insulation, and for jackets.

Power Factor: The ratio of resistance to impedance. The ratio of the actual power of an alternating current to apparent power. Mathematically, the cosine of the angle between the voltage applied and the current resulting.

Primary Insulation: The first layer of non-conductive material applied over a conductor, whose prime function is to act as electrical insulation.

Pulling Eye: A device fastened to a cable to which a hook may be attached in order to pull the cable.

Quad: Four insulated wires of a single circuit.

REA: Rural Electrification Administration. A branch of the U.S. Department of Agriculture.

Reactance: The opposition offered to the flow of alternating current by inductance or capacitance of a component or circuit.

Reel Drum Diameter: Diameter of the drum (or hub) of the reel.

Reel Flange Diameter (Reel Height): Diameter of the reel flanges

Reel Traverse: Width of space between reel flanges.

Reel Width: Overall width of reel.

Ridge Marker: One or more ridges running laterally along the outer surface of a insulated wire or cable for purposes of identification.

Root Mean Square (RMS): The effective value of an alternating current or voltage.

Rope Lay Conductor: A conductor composed of a central core surrounded by one or more layers of helically laid groups of wires used in portable cables.

Rubber: A general term used to describe wire insulation and jackets made of thermosetting elastomers, such as natural or synthetic rubbers, EPR, neoprene, Hypalon, butyl rubber, and others.

SBR: A copolymer of styrene and butadiene. Also GR-S or Buna-S. Most commonly used type of synthetic rubber.

Self Extinguishing: The characteristic of a material whose flame is extinguished after the igniting flame is removed.

Semi-Conductor: In wire industry terminology, a material possessing electrical conductivity that falls somewhere between that of conductors and insulators. Usually made by adding carbon particles to an insulator (e.g. conductor shield and insulation shield). Not the same as semi-conductor materials such as silicon, germanium, etc. used for making transistors and diodes.

Separator: Pertaining to wire and cable, a layer of insulating material such as textile paper, Mylar, etc. which is placed between a conductor and its dielectric, between a cable jacket and the components it covers, or between various components of a multi-conductor cable. It can be utilized to improve stripping qualities, flexibility, or can offer additional mechanical or electrical protection to the components it separates.

Served Wire Armor (SWA): Spiral wrap of galvanized steel wires applied around a cable to afford mechanical protection and increase the cable pulling tension characteristics, (mineshaft, submarine cable, etc.). Also used to denote steel wire armor.

Sheath: The outer covering or jacket of a multi-conductor cable. Usually non-metallic.



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Shield (Electrostatic): In cables, a metallic layer placed around a conductor or group of conductors to prevent electrostatic interference between the enclosed wires and external fields. Also see Insulation Shield.

Shrink Tubing: Tubing which has been extruded, crosslinked, and mechanically expanded which when reheated will return to its original diameter.

SIA: Steel Interlocked Armor.

Side Wall Bearing Pressure (SWBP): A term used in reference to the pressure on a cable which is being pulled around a curved surface under tension. If excessive, SWBP can damage cable components and reduce the life of the cable.

Signal Cable: A cable designed to carry current of usually less than one ampere per conductor to operate signal circuit devices.

Silicone: A material made from silicone and oxygen. Can be in thermosetting elastomer or liquid form. The thermosetting elastomer form is noted for high heat resistance.

Skin Effect: The tendency of alternating current to concentrate and to travel only on the surface of a conductor. Tendency increases with increase in frequency.

Sleeving: An extruded tube.

Spark Test: A test designed to locate imperfections (usually pin-holes) in the insulation of a wire or cable by application of voltage for a very short period of time while the wire is being drawn through the electrode field.

Specific Gravity: The ratio of the density (mass per unit volume) of a material to that of water.

Specific Inductive Capacity (SIC): Same as dielectric constant (See Dielectric Constant).

Tank Test: A voltage insulation test in which the insulated wire or cable is submerged in water and voltage is applied between the conductor and water serving as ground. Shielded cables are generally not tank tested due to the possibility of introducing contaminants on the outer surface of the insulation.

Teflon®: DuPont Company trademark for fluorocarbon resins. (See FEP and TFE.)

Temperature Rating: The maximum temperature at which an insulating material may be used in continuous operation without loss of its basic properties (i.e. operating, overload, short circuit). The minimum temperature for safe handling.

Tensile Strength: The pull stress required to break a given specimen. Measured in pounds per square inch. Also referred to as "Ultimate Tensile Strength."

TFE: Tetrafluoroethylene. A thermoplastic material with good electrical insulating properties and chemical and heat resistance.

Thermoplastic: A material that can be softened repeatedly by heating and hardened by cooling through a temperature range characteristic of the plastic, and that in the softened state can be shaped by molding or extrusion.

Thermoset: A material that has been vulcanized by heat or other means and is substantially infusible and insoluble.

Three Conductor Cable: Three insulated conductors assembled with other necessary cable components (shield, filler, etc.) to form a core, protected by an overall jacket.

Tinned Copper: Tin coating added to copper to aid in soldering and inhibit corrosion.

Tray: A cable tray system is a unit or assembly of units or sections, and associated fittings, made of non-combustible materials forming a rigid structural system used to support cables. Cable tray systems (previously termed continuous rigid cable supports) include ladders, troughs, channels, solid bottom trays, and similar structures.

Tray Cable: A factory assembled multi-conductor or multi-pair control, signal or power cable specifically approved under the Canadian Electrical Code for installation in trays.

Triad: Three insulated wires of a single circuit forming a unit. (Two or more units are cabled to form a multi-triad cable.)

Triplexed Cable: Three individual cables twisted together.

UL: Underwriters Laboratories. A non-profit independent organization, which operates a listing service for electrical and electronic materials and equipment. (Canadian counterpart is CSA).

UHF: Abbreviation for ultra high frequency, 300 to 3,000 MHz.

Unilay: A conductor with more than one layer of helically laid wires with the direction of lay and length of lay the same for all layers.

Velocity of Propagation: The speed of an electrical signal down a length of cable compared to speed in free space expressed as a percent. It is the reciprocal of the square root of the dielectric constant of the cable insulation.

VHF: Abbreviation for very high frequency, 30 to 300 MHz.

Voltage: The term most often used in place of electromotive force, potential, potential difference or voltage drop to designate the electric pressure that exists between two points and is capable of producing a current when a closed circuit is connected between two points.



Glossary

Voltage Rating: 1) The highest voltage that can be continuously applied to a wire in conformance with the standard or specification; 2) The "system" voltage printed on the wire or cable.

Volume Resistivity: The electrical resistance between opposite faces of a one cm. cube of insulating material, commonly expressed in ohms-centimeter.

Vulcanization: An irreversible process during which a compound, through a change in its chemical structure (e.g. cross-linking), becomes less plastic and more resistant to swelling by organic liquids and elastic properties are conferred, improved or extended over a greater range of temperatures.

VW-1: A flammability rating established by Underwriters Laboratories for wires and cables that pass a specially designed vertical flame test, formerly designated FR-1. Similar to CSA designation FT1.

Watt: A unit of electric power.

Wicking: The longitudinal flow of a liquid in a wire or cable due to capillary action.

Wire: A conductor; bare or insulated.

Yield Strength: The minimum stress at which a material will start to physically deform without further increase in load.

Reference Standards

AAR S-501: Specification for Wire & Cables

AAR 581.3: Specification for Single Conductor, Clean Stripping Rubber Insulated, 0–600 Volts, Neoprene Jacketed Cable for Locomotive and Car Equipment

AAR 589: Specification for Single Conductor Chlorosulfonated Polyethylene Integral Insulated-Jacketed, 0–300V, 0–600V Cable for Locomotive and Car Equipment

AEIC CS 1: Specifications for Solid-Type Impregnated-Paper-Insulated Metallic Sheathed Cable

AEIC CS2: Specifications for Impregnated-Paper and Laminated Paper-Polypropylene Insulated Cable, High-Pressure Pipe-Type

AEIC CS3: Specifications for Impregnated-Paper-Insulated, Metallic Sheathed Cable, Low Pressure Gas-Filled Type

AEIC CS4: Specifications for Impregnated-Paper-Insulated Low and Medium Pressure Self Contained Liquid Filled Cable

AEIC CS5: Specifications for Thermoplastic and Crosslinked Polyethylene Insulated Shielded Power Cables Rated 5 Through 69 kV

AEIC CS6: Specifications for Ethylene Propylene Rubber Insulated Shielded Power Cables Rated 5 Through 69 kV

AEIC CS7: Specifications for Crosslinked Polyethylene Insulated Shielded Power Cables Rated 46 Through 138 kV

AEIC CS8: Specification for Extended Dielectric, Shielded Power Cables Rated 5 through 46 kV

ANSI C2: National Electrical Safety Code

ANSI MC96.1: Thermocouple Extension Wire Calibration

ANSI N45.2: Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants

ASTM B 1: Standard Specification for Hard-Drawn Copper Wire

ASTM B 2: Standard Specification for Medium-Hard-Drawn Copper Wire

ASTM B 3: Standard Specification for Soft or Annealed Copper Wire

ASTM B 8: Standard Specification for Concentric-Lay Stranded Copper Conductors, Hard, Medium-Hard, or Soft

ASTM B 33: Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes

ASTM B 105: Standard Specification for Hard-Drawn Copper Alloy Wires for Electrical Conductors

ASTM B 170: Standard Specification for Oxygen-Free Electrolytic Copper

ASTM B 172: Standard Specification for Rope-Lay-Stranded Copper Conductors Having Bunch-Stranded Members, for Electrical Conductors

ASTM B 173: Standard Specification for Rope-Lay-Stranded Copper Conductors Having Concentric-Stranded Members, for Electrical Conductors

ASTM B 174: Standard Specification for Bunch-Stranded Copper Conductors for Electrical Conductors

ASTM B 189: Standard Specification for Lead-Coated and Lead-Alloy-Coated Soft Copper Wire for Electrical Purposes

ASTM B 193: Standard Test Method for Resistivity of Electrical Conductor Materials

ASTM B 226: Standard Specification for Cored, Annular, Concentric-Lay-Stranded Copper Conductors

ASTM B 227: Standard Specification for Hard-Drawn Copper-Clad Steel Wire

ASTM B 228: Standard Specification for Concentric-Lay-Stranded Copper-Clad Steel Conductors

ASTM B 229: Standard Specification for Concentric-Lay-Stranded Copper and Copper-Clad Steel Composite Conductors

ASTM B 230: Standard Specification for Aluminum 1350-H19 Wire for Electrical Purposes

ASTM B 230M: Standard Specification for Aluminum 1350-H19 Wire for Electrical Purposes [Metric]

ASTM B 231: Standard Specification for Concentric-Lay-Stranded Aluminum 1350 Conductors

ASTM B 231 M: Standard Specification for Concentric-Lay-Stranded Aluminum 1350 Conductors [Metric]

ASTM B 232: Standard Specification for Concentric-Lay-Stranded Aluminum Conductors, Coated Steel-Reinforced (ACACARSR)

ASTM B 232M: Standard Specification for Concentric-Lay-Stranded Aluminum Conductors, Coated Steel-Reinforced (ACSR) [Metric]

ASTM B 233: Standard Specification for Aluminum 1350 Drawing Stock for Electrical Purposes

ASTM B 246: Standard Specification for Tinned Hard-Drawn and Medium-Hard-Drawn Copper Wire for Electrical Purposes

ASTM B 258: Standard Specification for Standard Nominal Diameters and Cross-Sectional Areas of AWG Sizes of Solid Round Wires Used as Electrical Conductors

ASTM B 263: Standard Test Method for Determination of Cross-Sectional Area of Stranded Conductors

ASTM B 286: Standard Specification for Copper Conductors for Use in Hookup Wire for Electronic Equipment

ASTM B 298: Standard Specification for Silver-Coated Soft or Annealed Copper Wire

ASTM B 324: Standard Specification for Nickel-Coated Soft or Annealed Copper Wire

ASTM B 341: Standard Specification for Aluminum-Coated (Aluminized) Steel Core Wire for Aluminum Conductors, Steel-Reinforced (ACSR/AZ)

ASTM B 341M: Standard Specification for Aluminum-Coated (Aluminized) Steel Core Wire for Aluminum Conductors, Steel-Reinforced (ACSR/AZ) [Metric]

ASTM B 355: Standard Specification for Nickel-Coated Soft or Annealed Copper Wire

ASTM B 397: Standard Specification for Concentric-Lay-Stranded Aluminum-Alloy 5005-H19 Conductors



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Reference Standards

ASTM B 398: Standard Specification for Aluminum-Alloy 6201-T81 Wire for Electrical Purposes

ASTM B 398M: Standard Specification for Aluminum-Alloy 6201-T81 Wire for Electrical Purposes [Metric]

ASTM B 399: Standard Specification for Concentric-Lay-Stranded Aluminum-Alloy 6201-T81 Conductors

ASTM B 399M: Standard Specification for Concentric-Lay-Stranded Aluminum-Alloy 6201-T81 Conductors [Metric]

ASTM B 400: Standard Specification for Compact Round Concentric-Lay-Stranded Aluminum 1350 Conductors

ASTM B 401: Standard Specification for Compact Round Concentric-Lay-Stranded Aluminum Conductors, Steel-Reinforced (ACSR/COMP)

ASTM B 416: Standard Specification for Concentric-Lay-Stranded Aluminum-Clad Steel Conductors

ASTM B 452: Standard Specification for Copper-Clad Steel Wire for Electronic Application

ASTM B 470: Standard Specification for Bonded Copper Conductors for Use in Hookup Wires for Electronic Equipment

ASTM B 496: Standard Specification for Compact Round Concentric-Lay-Stranded Copper Conductors

ASTM B 498: Standard Specification for Zinc-Coated (Galvanized) Steel Core Wire for Aluminum Conductors, Steel-Reinforced (ACSR)

ASTM B 498M: Standard Specification for Zinc-Coated (Galvanized) Steel Core Wire for Aluminum Conductors, Steel-Reinforced (ACSR) [Metric]

ASTM B 500: Standard Specification for Zinc-Coated (Galvanized), Zinc-5% Aluminum Mischmetal Alloy-Coated, and Aluminum-Coated (Aluminized) Stranded Steel Core for Aluminum Conductors, Steel-Reinforced (ACSR)

ASTM B 501: Standard Specification for Silver-Coated, Copper-Clad Steel Wire for Electronic Application

ASTM B 502: Standard Specification for Aluminum-Clad Steel Core Wire for Aluminum Conductors, Aluminum-Clad Steel Reinforced

ASTM B 520: Standard Specification for Tin-Coated, Copper-Clad Steel Wire for Electronic Application

ASTM B 524: Standard Specification for Concentric-Lay-Stranded Aluminum Conductors, Aluminum-Alloy Reinforced (ACAR, 1350/6201)

ASTM B 524M: Standard Specification for Concentric-Lay-Stranded Aluminum Conductors, Aluminum-Alloy Reinforced (ACAR, 1350/6201) [Metric]

ASTM B 549: Standard Specification for Concentric-Lay-Stranded Aluminum Conductors, Aluminum-Clad Steel Reinforced (ACSR/AW)

ASTM B 559: Standard Specification for Nickel-Coated, Copper-Clad Steel Wire for Electronic Application

ASTM B 606: Standard Specification for High-Strength Zinc-Coated (Galvanized) Steel Core Wire for Aluminum and Aluminum Alloy Conductors, Steel Reinforced

ASTM B 609: Standard Specification for Aluminum 1350 Round Wire, Annealed and Intermediate Tempers, for Electrical Purposes

ASTM B 609M: Standard Specification for Aluminum 1350 Round Wire, Annealed and Intermediate Tempers, for Electrical Purposes [Metric]

ASTM B 624: Standard Specification for High-Strength, High-Conductivity Copper-Alloy Wire for Electronic Application

ASTM B 682: Standard Specification for Standard Metric Sizes of Electrical Conductors

ASTM B 701: Standard Specification for Concentric-Lay-Stranded Self-Damping Aluminum Conductors, Steel-Reinforced (ACSR/SD)

ASTM B 711: Standard Specification for Concentric-Lay-Stranded Aluminum-Alloy Conductors, Steel Reinforced (AACSR) (6201)

ASTM B 738: Standard Specification for Fine-Wire Bunch-Stranded and Rope-Lay Bunch Stranded Copper Conductors for Use as Electrical Conductors

ASTM B 778: Standard Specification for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors (AAC/TW)

ASTM B 779: Standard Specification for Shaped Wire Compact Concentric-Lay-Stranded Aluminum Conductors, Steel Reinforced (ACSR/TW)

ASTM B 784: Standard Specification for Modified Concentric-Lay-Stranded Copper Conductors for Use in Insulated Electrical Cables

ASTM B 785: Standard Specification for Compact Round Modified Concentric-Lay-Stranded Copper Conductors for Use in Insulated Electrical Cables

ASTM B 786: Standard Specification for 19 Wire Combination Unilay-Stranded Aluminum 1350 Conductors for Subsequent Insulation

ASTM B 787: Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation

ASTM B 801: Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy for Subsequent Covering or Insulation

ASTM B 802: Standard Specification for Zinc-5% Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR)

ASTM B 803: Standard Specification for High-Strength Zinc-5 % Aluminum-Mischmetal Alloy Coated Steel Core Wire for Aluminum and Aluminum-Alloy Conductors, Steel Reinforced

ASTM D 149: Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies

ASTM D 470: Method of Testing Crosslinked Insulations and Jackets for Wire and Cable

ASTM D 866: Specification for Styrene-Butadiene (SBR) Synthetic Rubber Jacket for Wire and Cable



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Reference Standards

ASTM D 1047: Specification for Polyvinyl Chloride (PVC) Jacket for Wire and Cable

ASTM D 1351: Specification for Polyethylene Insulation for Wire and Cable

ASTM D 1352: Specification for Ozone-Resisting Butyl Rubber Insulation for Wire and Cable

ASTM D 1523: Method for Synthetic Rubber Insulation for Wire and Cable, 90° Operation

ASTM D 1679: Specification for Synthetic Rubber Heat and Moisture-Resisting Insulation for Wire and Cable, 75°C Operation

ASTM D 2219: Specification for Polyvinyl Chloride (PVC) Insulation for Wire and Cable, 60° Operation

ASTM D 2220: Specification for Polyvinyl Chloride (PVC) Insulation for Wire and Cable, 75° Operation

ASTM D 2308: Specification for Polyethylene Jacket for Electrical Insulated Wire and Cable

ASTM D 2526: Specification for Ozone-Resisting Silicone Rubber Insulation for Wire and Cable

ASTM D 2655: Specification for Crosslinked Polyethylene Insulation for Wire and Cable Rated 0 to 2000V

ASTM D 2656: Specification for Crosslinked Polyethylene Insulation for Wire and Cable Rated 2001 to 35000V

ASTM D 2768: Specification for General-Purpose Ethylene-Propylene Rubber Jacket for Wire and Cable

ASTM D 2770: Specification for Ozone-Resisting Ethylene-Propylene Rubber Integral Insulation and Jacket for Wire and Cable

ASTM D 2802: Specification for Ozone-Resistant Ethylene-Propylene Rubber Insulation for Wire and Cable

ASTM D 3004: Specification for Extruded Thermosetting and Thermoplastic Semi-Conducting Conductor and Insulation Shields

ASTM D 3485: Specification for Smooth-Wall Coilable Polyethylene (PE) Conduit (Duct) for Preassembled Wire and Cable

ASTM D 3554: Specification for Track-Resistant Black Thermoplastic High Density Polyethylene Insulation for Wire and Cable

ASTM D 3555: Specification for Track-Resistant Black Crosslinked Thermosetting Polyethylene Insulation for Wire and Cable

ASTM D 4244: Specification for General-Purpose, Heavy-Duty and Extra-Heavy Duty Acrylonitrile-Butadiene/ Polyvinyl Chloride (NBR/PVC) Jackets for Wire and Cable

ASTM D 4245: Specification for Ozone-Resistant Thermoplastic Elastomer Insulation for Wire and Cable, 90°C Dry - 75°C Wet Operation

ASTM D 4246: Specification for Ozone-Resistant Thermoplastic Elastomer Insulation for Wire and Cable, 90°C Operation

ASTM D 4247: Specification for General-Purpose Black Heavy-Duty and Black Extra-Heavy Duty Polychloroprene Jackets for Wire and Cable

ASTM D 4313: Specification for General Purpose Heavy-Duty and Extra-Heavy-Duty Crosslinked Chlorinated Polyethylene Jackets for Wire and Cable

ASTM D 4314: Specification for General Purpose Heavy-Duty and Extra-Heavy-Duty Crosslinked Chlorosulfonated Polyethylene Jackets for Wire and Cable

ASTM D 4363: Specification for Thermoplastic Chlorinated Polyethylene Jacket for Wire and Cable

ASTM D 4496: Test Method of DC Resistance or Conductance of Moderately Conductive Materials

ASTM D 4568: Test Methods for Evaluating Compatibility Between Cable Filling and Flooding Compounds and Polyolefin Cable Materials

ASTM D 4967: Guide for Selecting Materials to Be Used for Insulation, Jacketing, and Strength Components in Fiber Optic Cables

CAN3-Z299.0: Guide for Selecting and Implementing the CAN3-Z299 Quality Assurance Program Standards

CAN3-Z299.1: Standard for Quality Assurance Program - Category 1

CAN3-Z299.2: Standard for Quality Assurance Program - Category 2

CAN3-Z299.3: Standard for Quality Assurance Program - Category 3

CAN3-Z299.4: Standard for Quality Assurance Program - Category 4

CAN/CSA C22.2 No. 211: Standard for Cord Sets and Power-Supply Cords

CAN/CSA C22.2 No. 48: Standard for Nonmetallic Sheathed Cable

CAN/CSA C22.2 No. 49: Standard for Flexible Cords and Cables

CAN/CSA C22.2 No. 51: Standard for Armored Cable

CAN/CSA C22.2 No. 96: Standard for Portable Power Cables

CAN/CSA C22.2 No. 130.1: Standard for Heat-Tracing Cable Systems for Use in Industrial Locations

CAN/CSA C22.2 No. 131: Standard for Type TECK 90 Cable

CAN/CSA C22.2 No. 203: Standard for Modular Wiring Systems for Office Furniture

CAN/CSA C22.2 No. 210.2: Standard for Appliance Wiring Material Products

CAN/CSA C22.2 No. 214: Standard for Communications Cables

CAN/CSA C22.2 No. 233: Standard for Cords and Cord Sets for Communication Systems

CAN/CSA C22.2 No. 239: Standard for Control and Instrumentation Cables

CAN/CSA C22.2 No. 241: IEEE Standard for Cable Joints for Use with Extruded Dielectric Cable Rated 5,000V Through 46,000V, and Cable Joints for Use with Laminated Dielectric Cable Rated 2,500V Through 500,000V (Adopted IEEE 404-1986)

CAN/CSA C22.3 No. 1: Standard for Overhead Systems

CAN/CSA C22.3 No. 8: Standard for Railway Electrification Guidelines

CAN/CSA C49.1: Standard for Round Wire, Concentric Lay, Overhead Electrical Conductors



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Reference Standards

CAN/CSA C68.3: Standard for Shielded and Concentric Neutral Power Cables Rated 5-46 kV

CAN/CSA T529: Standard Design Guide for Telecommunications Wiring Systems in Commercial Buildings

CSA C22.1: Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations

CSA C22.2 No. 0.3: Standard for Test Methods for Electrical Wires and Cables

CSA C22.2 No. 16: Standard for Insulated Conductors for Power-Operated Electronic Devices

CSA C22.2 No. 35: Standard for Extra-Low-Voltage Control Circuit Cables, Low-Energy Control Cable, and Extra-Low-Voltage Control Cable

CSA C22.2 No. 38: Standard for Thermoset Insulated Wires and Cables

CSA C22.2 No. 52: Standard for Service-Entrance Cables

CSA C22.2 No. 75: Standard for Thermoplastic-Insulated Wires and Cables

CSA C22.2 No. 116: Standard for Coil-Lead Wires

CSA C22.2 No. 123: Standard for Aluminum Sheathed Cables

CSA C22.2 No. 124: Standard for Mineral-Insulated Cable

CSA C22.2 No. 127: Standard for Equipment Wires

CSA C22.2 No. 129: Standard for Neutral Supported Cable

CSA C22.2 No. 130: Standard for Heating Cables and Heating Cable Sets

CSA C22.2 No. 138: Standard for Heat Tracing Cable and Cable Sets for Use in Hazardous Locations

CSA C22.2 No. 174: Standard for Cables and Cable Glands for Use in Hazardous Locations

CSA C22.2 No. 179: Standard for Airport Series Lighting Cables

CSA C22.2 No. 188: Standard for Splicing Wire and Cable Connectors

CSA C22.2 No. 198.2: Standard for Underground Cable Splicing Kits

CSA C22.2 No. 208: Standard for Fire Alarm and Signal Cable

CSA C22.2 No. 222: Standard for Type FCC Under-Carpet Wiring System

CSA C22.2 No. 230: Standard for Tray Cable

CSA C22.2 No. 232: Standard for Optical Fiber Cables

CSA/CAN3 C22.3 No. 7: Standard for Underground Systems

CSA C49.2: Standard for Compact Aluminum Conductors Steel Reinforced (ACSR)

CSA C49.3: Standard for Aluminum Alloy 1350 Round Wire, All Tempers, for Electrical Purposes

CSA C49.4: Standard for Concentric-Lay Aluminum Stranded Conductors (ASC)

CSA C49.5: Standard for Compact Round Concentric-Lay Aluminum Stranded Conductors (Compact ASC)

CSA CAN3-C49.6: Standard for Zinc-Coated Steel Wires for Use in Overhead Electrical Conductors

CSA CAN3-C49.7: Standard for Aluminum Round Wires for Use in Overhead Electrical Conductors

CSA C68.1: Standard Specifications for Impregnated Paper-Insulated, Metallic-Sheathed Cable, Solid-Type

CSA C170.2: Standard for Polyethylene Protective Covering on Paper-Insulated Metallic Sheathed Power Cable

CSA C170.3: Standard for Polyvinyl-Chloride (PVC) Protective Covering on Paper-Insulated Metallic-Sheathed Power Cable

CSA M421: Standard for Use of Electricity in Mines

EIA/TIA-568: Commercial Building Telecommunications Wiring Standard

EIA/TIA-569: Commercial Building Standard for Telecommunications Pathways and Spaces

EIA/TIA-606: Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

EIA/TIA TSB-36: Additional Cable Specifications for Unshielded Twisted Pair Cables (Technical Systems Bulletin 36)

EIA/TIA TSB-40: Additional Transmission Specifications for Unshielded Twisted Pair Connecting Hardware (Technical Systems Bulletin 40)

FP-4: TM-4 CSA CBC and UL CMR (Riser) Cable

FP-16: TD-16 Plastic Insulated, Two Parallel Conductor, Telephone Drop Wire

FP-28: Air Core, Solid PIC, ALPETH-DCAS Cable & PAP-DCAS Cable

FP-67: PHD Plastic Insulated and Jacketed, Four Conductor, Telephone Drop Wire

FP-68: TM-68 CSA PCC FT4, Shielded Inside Wiring Cable

FP-71: TM-28 CSA PCC FT4, Inside Wiring Cable

FP-75: PHILPLAST CSA PCC FT4, PVC Insulated and Jacketed, Switchboard Cable

FP-81: TM-81 CSA ZSW FT1, Telephone Station Wire

FP-90: CONCEL Cellular Polyethylene Insulated, Air Core, ALPETH-DCAS Sheathed, Telephone Cable

FP-93: TM-91, TM-92, TM-93 & TM-97, Filled, Buried Wire

FP-95: Quasi-Solid Polyethylene Insulated, Filled, Regular & Twin Core, ALPETH-DCAS Sheathed Cable

FP-98: CELSEAL Cellular Polyethylene Insulated, Filled, ALPETH-DCAS Sheathed Cable

FP-99: DUCTCEL Cellular Polyethylene Insulated, Air Core, ALPETH-DCAS Sheathed Telephone Cable

FP-8859: PHILSYM UL 444 CMR & CSA PCC FT4 Switchboard Cable

HP: See NEMA listing

ICEA P-32-382: ICEA Standards Publication for Short Circuit Characteristics of Insulated Cable



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Reference Standards

ICEA P-45-482: ICEA Standards Publication for Short-Circuit Performance of Metallic Shields and Sheaths of Insulated Cable

ICEA P-53-426: ICEA/NEMA Standards Publication for Ampacities, Including Effect of Shield Losses for Single-Conductor Solid-Dielectric Power Cable 15 kV through 69 kV (NEMA WC 50)

ICEA P-54-440: ICEA/NEMA Standards Publication for Ampacities of Cables in Open-Top Cable Trays (NEMA WC 51)

ICEA P-79-561: ICEA Guide for Selecting Aerial Cable Messengers & Lashing Wires

ICEA P-81-570: ICEA Standards Publication for Direct Burial 600 Volt Cable with Ruggedized Extruded Insulation

ICEA S-19-81: ICEA/NEMA Standards Publication for Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC 3)

ICEA S-56-434: ICEA/ANSI Standards Publication for Polyolefin Insulated Communications Cables for Outdoor Use

ICEA S-61-402: ICEA/NEMA Standards Publication for Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC 5)

ICEA S-66-524: ICEA/NEMA Standards Publication for Cross-Linked-Thermosetting Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC 7)

ICEA S-67-401: ICEA/NEMA Standards Publication for Steel Armor and Associated Coverings for Impregnated-Paper-Insulated Cables (NEMA WC 2)

ICEA S-68-516: ICEA/NEMA Standards Publication for Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC 8)

ICEA S-70-547: ICEA/ANSI Standards Publication for Weather-Resistant Polyolefin-Covered Wire and Cable

ICEA S-73-532: ICEA/NEMA/ANSI Standards Publication for Control Cables (NEMA WC 57)

ICEA S-75-381: ICEA/NEMA/ANSI Standards Publication for Portable and Power Feeder Cables for Use in Mines and Similar Applications (NEMA WC 58)

ICEA S-76-474: ICEA/ANSI Standards Publication for Neutral-Supported Power Cable Assemblies with Weather-Resistant Extruded Insulation, 600 Volts

ICEA S-77-528: ICEA/ANSI Standards Publication for Outside Plant Communications Cables, Specifying Metric Wire Sizes

ICEA S-80-576: ICEA/ANSI Standards Publication for Communications Wire and Cable for Wiring of Premises

ICEA S-81-570: Standard for Direct Burial 600 Volt Ruggedized Insulation

ICEA S-82-552: ICEA/NEMA Standards Publication for Instrumentation Cables and Thermocouple Wire (NEMA WC 55)

ICEA S-83-596: ICEA/ANSI Standards Publication for Fiber Optic Premises Distribution Cable

ICEA S-84-608: ICEA/ANSI Standards Publication for Telecommunications Cable, Filled Polyolefin Insulated, Copper Conductor

ICEA S-85-625: ICEA/ANSI Standards Publication for Aircore, Polyolefin Insulated, Copper Conductor Telecommunications Cable

ICEA S-86-634: ICEA/ANSI Standards Publication for Buried Distribution & Service Wire, Filled Polyolefin Insulated, Copper Conductor

ICEA S-87-640: ICEA/ANSI Standards Publication for Fiber Optic Outside Plant Communication Cable

ICEA S-93-639: ICEA/NEMA Standard for Shielded Power Cables Rated 5-46 KV for the Distribution of Electrical Energy (NEMA WC 74)

ICEA S-94-649: Standard for Concentric Neutral Cables Rated 5-46 KV

ICEA S-95-658: ICEA/NEMA Standard for Non-shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy (NEMA WC 70)

ICEA S-96-659: ICEA/NEMA Standard for Non-shielded Cables Rated 2001-5000 Volts for use in the Distribution of Electrical Energy (NEMA WC 71)

ICEA S-97-682: Standard for Utility Shielded Power Cable Rated 5-46 KV

ICEA S-105-692: Standard for 600 Volt Single Layer Thermoset Insulated Utility Underground Distribution Cable

ICEA T-22-294: ICEA Standard Test Procedures for Extended Time-Testing of Wire and Cable Insulations for Service in Wet Locations

ICEA T-25-425: ICEA Guide for Establishing Stability of Volume Resistivity for Conducting Polymeric Components of Power Cables

ICEA T-26-465: ICEA/NEMA Guide for Frequency of Sampling Extruded Dielectric Power, Control, Instrumentation, and Portable Cables for Test (NEMA WC 54)

ICEA T-27-581: ICEA/NEMA Standard Test Methods for Extruded Dielectric Power, Control, Instrumentation, and Portable Cables (NEMA WC 53)

ICEA T-28-562: ICEA Standard Test Method for Measurement of Hot Creep of Polymeric Insulations

ICEA T-29-520: ICEA Standard for Vertical Tray Flame Tests at 210,000 Btu

ICEA T-30-520: ICEA Standard for Vertical Tray Flame Tests at 70,000 Btu

ICEA T-31-610: ICEA Standard for Water Penetration Resistance Test, Sealed Conductor

ICEA T-32-645: ICEA Standards Publication for Compatibility of Sealed Conductor Filler Compounds

IEC 92-3: International Electrotechnical Commission Electrical Installation in Ships - Part 3 Cables (Constructions, Testing, and Installations)

IEEE 45: IEEE Recommended Practice for Electric Installations on Shipboard

IEEE 48: IEEE Standard Test Procedures and Requirements for High-Voltage Alternating Current Cable Terminations

IEEE 100: IEEE Standard Dictionary of Electrical and Electronics Terms



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IEEE 141: IEEE Recommended Practice for Electric Power Distribution for Industrial Plants ("IEEE Red Book")

IEEE 142: IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems ("IEEE Green Book")

IEEE 241: IEEE Recommended Practice for Electric Power Systems in Commercial Buildings ("IEEE Gray Book")

IEEE 242: IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems ("IEEE Buff Book")

IEEE 323: IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations

IEEE 383: IEEE Standard for Type Test of Class 1E Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations

IEEE 400: IEEE Guide for Making High-Direct-Voltage Tests on Power Cable Systems in the Field

IEEE 404: IEEE Standard for Cable Joints for Use with Extruded Dielectric Cable Rated 5,000V Through 46,000V, and Cable Joints for Use with Laminated Dielectric Cable Rated 2,500V Through 500,000V (Adopted as a National Standard of Canada, CAN/CSA-C22.2 No. 241)

IEEE 446: IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications ("IEEE Orange Book")

IEEE 493: IEEE Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems ("IEEE Gold Book")

IEEE 515: IEEE Recommended Practice for the Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Industrial Applications

IEEE 524: IEEE Guide to the Installation of Overhead Transmission Line Conductors

IEEE 525: IEEE Guide for the Design and Installation of Cable Systems in Substations

IEEE 575: IEEE Guide for the Application of Sheath-Bonding Methods for Single-Conductor Cables and the Calculation of Induced Voltages and Currents in Cable Sheaths

IEEE 576: IEEE Recommended Practice for Installation, Termination, and Testing of Insulated Power Cable as Used in the Petroleum and Chemical Industry

IEEE 590: IEEE Cable Plowing Guide

IEEE 602: IEEE Recommended Practice for Electric Systems in Health Care Facilities ("IEEE White Book")

IEEE 635: IEEE Guide for Selection and Design of Aluminum Sheaths for Power Cables

IEEE 644: IEEE Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines

IEEE 738: IEEE Standard for Calculation of Bare Overhead Conductor Temperature and Ampacity Under Steady-State Conditions

IEEE 789: IEEE Standard Performance Requirements for Communications and Control Cables for Application in High Voltage Environments

IEEE 802.3: IEEE Standard for Information Processing Systems - Local and Metropolitan Area Networks - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications (ISO/IEC) (ANSI/IEEE Std 802.3)

IEEE 802.5: IEEE Standard for Information Technology - Local and Metropolitan Area Networks - Part 5: Token Ring Access Method and Physical Layer Specifications (ISO/IEC) (ANSI/IEEE Std 802.5)

IEEE 816: IEEE Guide for Determining the Smoke Generation of Solid Materials Used for Insulations and Coverings of Electric Wire and Cable

IEEE 844: IEEE Recommended Practice for Electrical Impedance, Induction, and Skin Effect Heating of Pipelines and Vessels

IEEE 1017: IEEE Recommended Practice for Field Testing Electric Submersible Pump Cable

IEEE 1018: IEEE Recommended Practice for Specifying Electric Submersible Pump Cable - Ethylene-Propylene Rubber Insulation

IEEE 1019: IEEE Recommended Practice for Specifying Electric Submersible Pump Cable - Polypropylene Insulation

IEEE 1120: IEEE Guide to the Factors to Be Considered in the Planning, Design, and Installation of Submarine Power and Communications Cables

IEEE 1202: IEEE Standard for Flame Testing of Cables for Use in Cable Tray in Industrial and Commercial Occupancies

IEEE/ICEA S-135: Power Cable Ampacities

Mil-C-17: General Specifications for Flexible and Semirigid Radio Frequency Cables

Mil-C-915F: General Specification for Electrical Cable and Conductors for Shipboard Use

Mil-C-13777: General Specification for Special Purpose Electrical Cable

Mil-C-24640: General Specification for Lightweight Electrical Cable for Shipboard Use

Mil-C-24643: General Specification for Low Smoke Electrical Cable and Conductors for Shipboard Use

Mil-C-27500: General Specification for Shielded and Unshielded Electrical Power Cable and Special Purpose Cable

Mil-C-85045: General Specification for Fiber Optic Cables [Metric]

Mil-W-16878: General Specification for Insulated Electrical Wire

Mil-W-22759: General Specification for Copper or Copper Alloy Fluoropolymer-Insulated Electrical Wire

Mil-W-81044: General Specification for Copper or Copper Alloy, Crosslinked Polyalkene, Crosslinked Alkane-Imide Polymer or Polyalkene Insulated Electrical Wire

Mil-W-81381: General Specification for Replacement Wire



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Reference Standards

Mil-W-85485: General Specification for Radio Frequency Absorptive Filter Line Electrical Cable

NAVSEA 6710782: Fiber Optic & Multimode Cable

NEMA HP 3: Electrical and Electronic PTFE (Polytetrafluoro-ethylene) Insulated High Temperature Hook-Up Wire; Types (600 Volt), EE (1000 Volt), and ET (250 Volt)

NEMA HP 4: Electrical and Electronic FEP Insulated High Temperature Hook-Up Wire; Types K, KK, and KT

NEMA HP 100: High Temperature Instrumentation and Control Cables

NEMA HP 100.1: High Temperature Instrumentation and Control Cables Insulated and Jacketed with FEP Fluorocarbons

NEMA HP 100.2: High Temperature Instrumentation and Control Cables Insulated and Jacketed with ETFE Fluoropolymers

NEMA HP 100.3: High Temperature Instrumentation and Control Cables Insulated and Jacketed with Cross-Linked (Thermoset) Polyolefin (XLPO)

NEMA HP 100.4: High Temperature Instrumentation and Control Cables Insulated and Jacketed with ECTFE Fluoropolymers

NEMA WC 2: Steel Armor and Associated Coverings for Impregnated-Paper-Insulated Cables (ICEA S-67-401)

NEMA WC 3: Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (ICEA S-19-81)

NEMA WC 5: Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (ICEA S-61-402)

NEMA WC 7: Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (ICEA S-66-524)

NEMA WC 8: Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (ICEA S-68-516)

NEMA WC 26: Wire and Cable Packaging

NEMA WC 50: Ampacities, Including Effect of Shield Losses for Single-Conductor Solid Dielectric Power Cable 15 kV through 69 kV (ICEA P-53-426)

NEMA WC 51: Ampacities of Cables in Open-Top Cable Trays (ICEA P-54-440)

NEMA WC 52: High Temperature and Electronic Insulated Wire-Impulse Dielectric Testing

NEMA WC 53: Standard Test Methods for Extruded Dielectric Power, Control, Instrumentation, and Portable Cables (ICEA T-27-581)

NEMA WC 54: Guide for Frequency of Sampling Extruded Dielectric Power, Control, Instrumentation, and Portable Cables for Test (ICEA T26-465)

NEMA WC 55: Instrumentation Cables and Thermocouple Wire (ICEA S-82-552)

NEMA WC 56: 3.0 kHz Insulation Continuity Proof Testing of Hook-Up Wire

NEMA WC 57: Standard for Control Cables (ICEA S-73-532)

NEMA WC 58: Standard for Portable and Power Feeder Cables for Use in Mines and Similar Applications (ICEA S-75-381)

NEMA WC 61: Transfer Impedance Testing

NEMA WC 62: Repeated Spark/Impulse Dielectric Testing

NEMA WC 70: Standard for Non-shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy (ICEA S-95-668)

NEMA WC 71: Standard for Non-shielded Cables Rated 2001-5000 Volts for Use in the Distribution of Electrical Energy (ICEA S-96-659)

NEMA WC 74: Standard for Shielded Power Cables Rated 5-46 KV for the Distribution of Electrical Energy (ICEA S-93-639)

NFPA 70: National Electrical Code

NFPA 70HB: National Electrical Code Handbook

NFPA 262: Test for Fire and Smoke Characteristics of Wires and Cables

ONT M-302-84: Cable, Secondary, for Direct Burial

ONT M-355-82: Cable, Primary Submarine

ONT M-538-84: Cable, For Use in Generating Stations (5 kV and Above)

ONT M-570-84: Cable, For Use in Generating Stations (600V)

ONT M-695-88: Cable, Primary and Subtransmission Submarine, Concentric Neutral

SAE 1560: Low Tension Thin Wall Primary Cable

SAE J1127: Battery Cable

SAE J1128: Low Tension Primary Cable

TIA: See EIA/TIA

UL 4: Standard for Armored Cable

UL 13: Standard for Power-Limited Circuit Cables

UL 44: Standard for Rubber-Insulated Wires and Cables

UL 62: Standard for Flexible Cord and Fixture Wire

UL 83: Standard for Thermoplastic-Insulated Wires and Cables

UL 183: Standard for Manufactured Wiring Systems

UL 444: Standard for Communications Cables

UL 486A: Standard for Wire Connectors and Soldering Lugs for Use With Copper Conductors

UL 486B: Standard for Wire Connectors and Soldering Lugs for Use With Aluminum Conductors

UL 486C: Standard for Splicing Wire Connectors

UL 486D: Standard for Insulated Wire Connectors for Use With Underground Conductors

UL 486E: Standard for Equipment Wiring Terminals for Use With Aluminum and/or Copper Conductors

UL 493: Standard for Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables



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UL 498: Standard for Attachment Plugs and Receptacles

UL 514B: Standard for Fittings for Conduit and Outlet Boxes

UL 719: Standard for Nonmetallic-Sheathed Cables

UL 758: Standard for Appliance Wiring Material - Component

UL 814: Standard for Gas-Tube-Sign and Ignition Cable

UL 817: Standard for Cord Sets and Power-Supply Cords

UL 854: Standard for Service-Entrance Cables

UL 910: Standard for Test for Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables Used in Spaces Transporting Environmental Air

UL 1023: Standard for Household Burglar-Alarm System Units

UL 1063: Standard for Machine-Tool Wires and Cables

UL 1072: Standard for Medium-Voltage Power Cables

UL 1084: Standard for Hoistway Cables

UL 1263: Standard for Irrigation Cables

UL 1277: Standard for Electrical Power and Control Tray Cables With Optional Optical Fiber Members

UL 1309: Standard for Marine Shipboard Cable

UL 1424: Standard for Cables for Power-Limited Fire-Protective-Signaling Circuits

UL 1426: Standard for Cables for Boats

UL 1446: Standard for Systems of Insulating Materials - General

UL 1462: Standard for Mobile Home Pipe Heating Cable

UL 1569: Standard for Metal-Clad Cables

UL 1581: Reference Standard for Electrical Wires, Cables, and Flexible Cords

UL 1588: Standard for Roof and Gutter De-Icing Cable Units

UL 1666: Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts

UL 1673: Standard for Electric Space Heating Cables

UL 1685: Standard for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables

UL 1690: Standard for Data Processing (DP) Cables

UL 1712: Standard Tests for Ampacity of Insulated Electrical Conductors Installed in the Fire Protective System

UL 1807: Standard for Fire Resistant Cable Coating Materials

UL 2023: Standard Test Method for Flame and Smoke Characteristics of Nonmetallic Wiring Systems (Raceway and Conductors) for Environmental Air-Handling Spaces

UL 2029: Standard for Gas/Vapor-Blocked Cable Classified for Use in Class 1 Hazardous (Classified) Locations

UL 2049: Standard for Residential Pipe Heating Cable

WC: See NEMA listing

Reference Standards

STANDARDS ARE AVAILABLE FROM THE FOLLOWING ORGANIZATIONS:**American Association of Railroads (AAR)**

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FP Standards are available from:

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IEC STANDARDS ARE AVAILABLE FROM ANSI:**Institute of Electrical and Electronic Engineers (IEEE)**

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